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Yamashita

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(54) **DRIVING DEVICE OF VEHICLE DOOR LATCH UNIT**

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H02P 3/00 (2006.01)
E05B 1/00 (2006.01)

(52) **U.S. Cl.**
CPC ***E05B 1/00*** (2013.01)

(58) **Field of Classification Search**
CPC E05B 81/34; Y10T 292/1047; Y10T 292/1082; Y10T 292/699; Y10T 292/1046
USPC 318/468
See application file for complete search history.

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JP	2014-009477	A	1/2014

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(57) **ABSTRACT**

A driving device includes: a neutral switch switches over from ON to OFF when an automatic closing function by a motor is operated and a first cam surface is released from a contact with the neutral switch; and a gear detection switch switches over from ON to OFF when an automatic closing function by the motor is operated and a second cam surface is released from a contact with the gear detection switch, wherein the operation of the automatic closing function by the motor is configured to be initiated by switch-over of a ratchet switch of the door latch unit from OFF to ON and ended by switch-over of the neutral switch from OFF to ON, and the gear detection switch is configured to switch over from OFF to ON by coming into contact with the second cam surface when the automatic releasing function by the motor is operated.

1 Claim, 8 Drawing Sheets

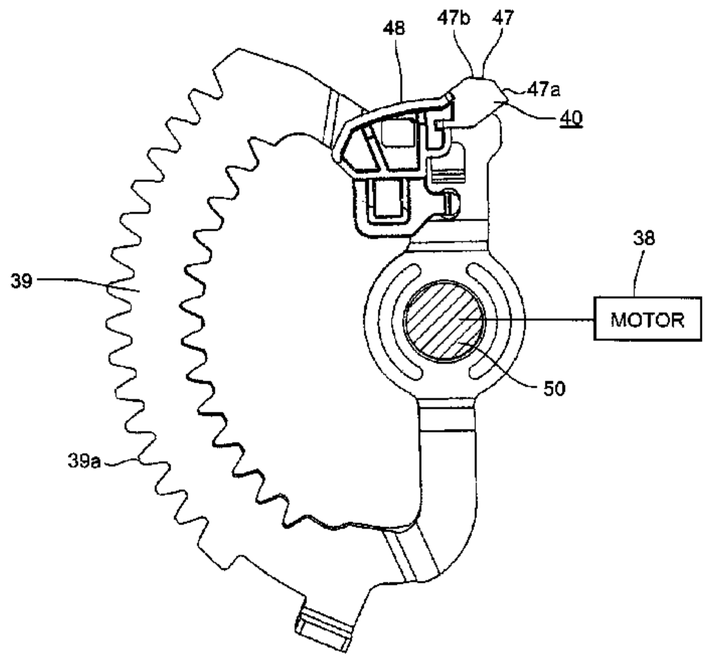


FIG.1

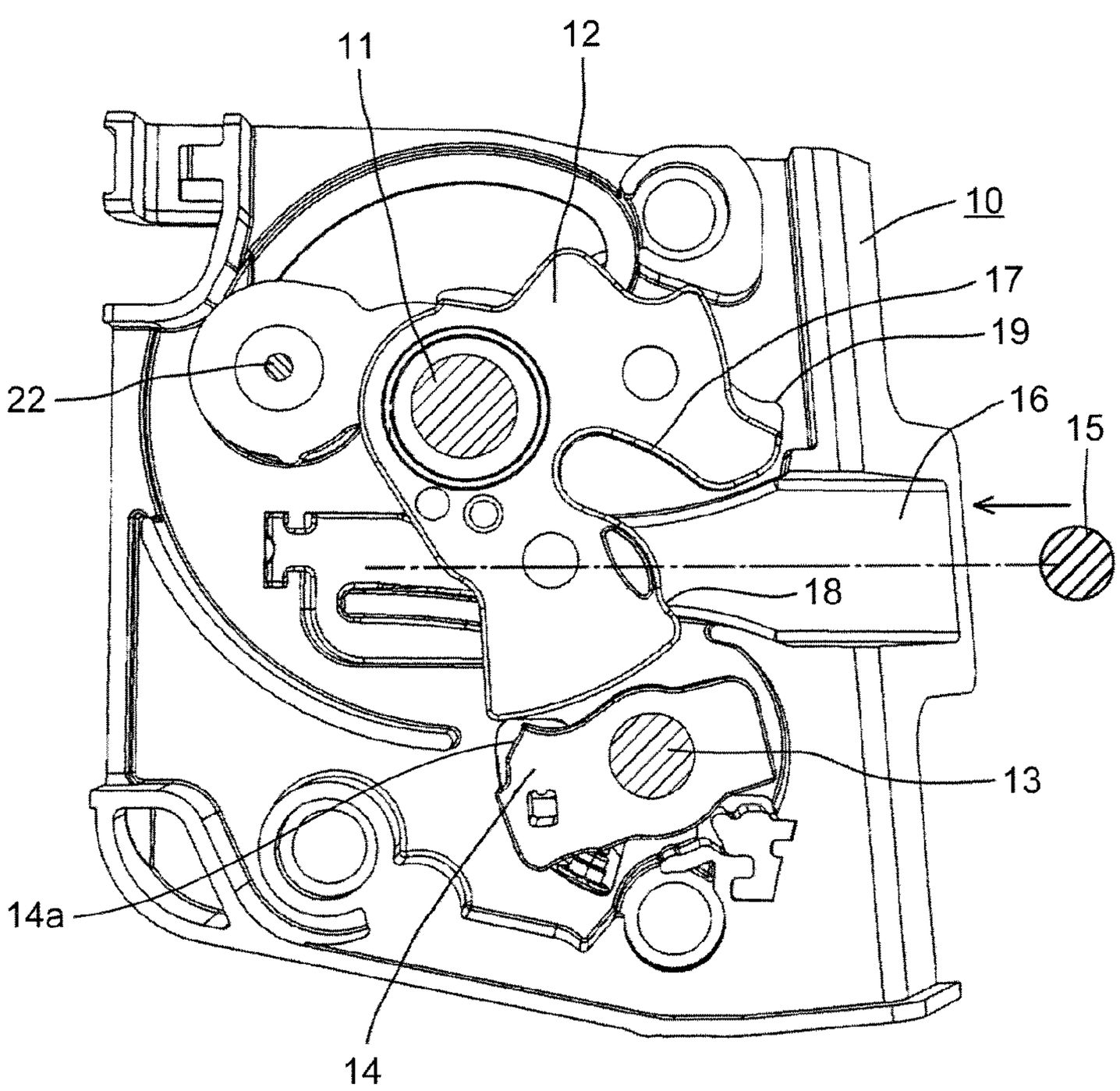


FIG.2

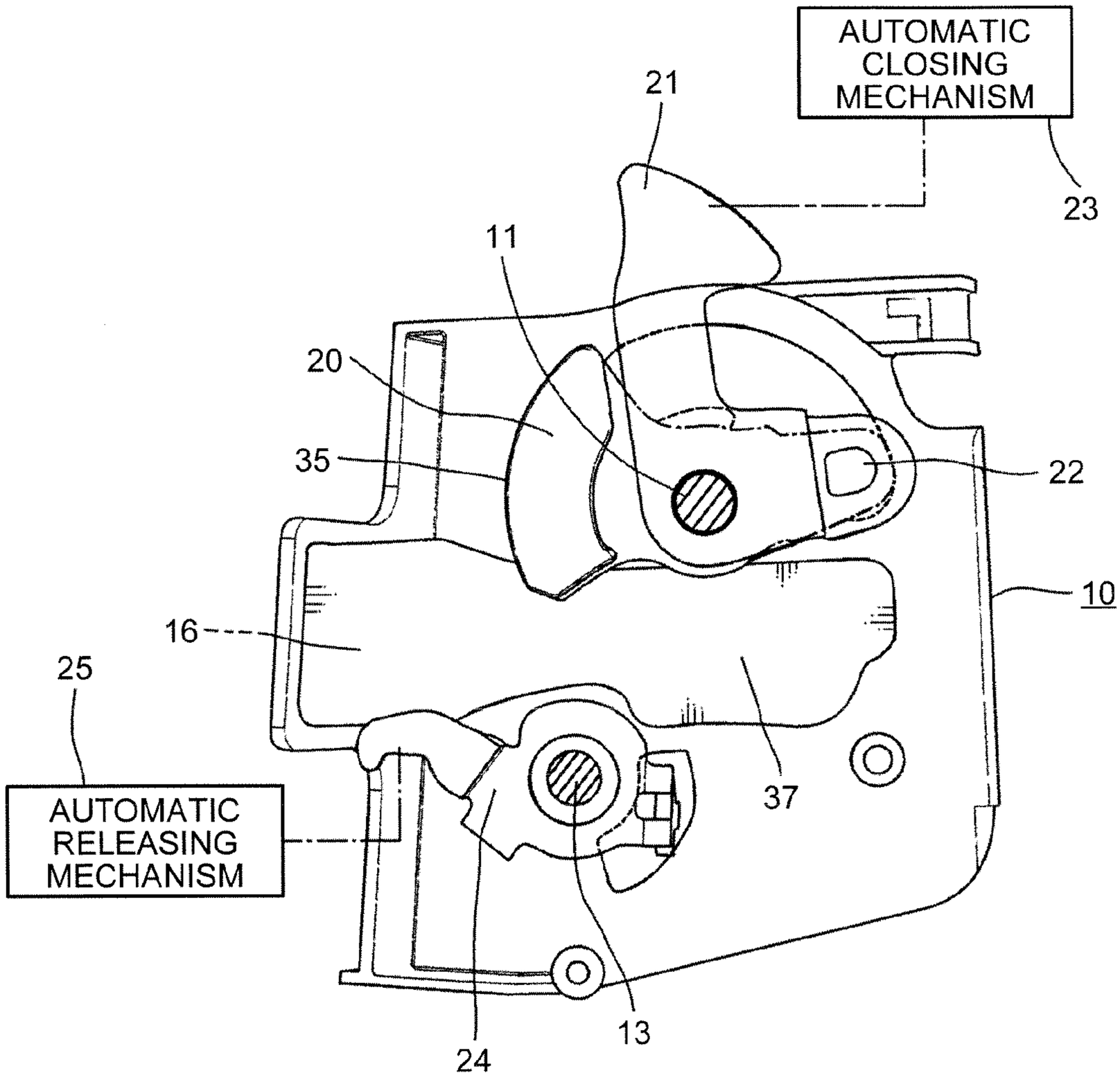

AUTOMATIC CLOSING MECHANISM
21
23
11
20
35
22
10
16
25
37
AUTOMATIC RELEASING MECHANISM
13
24

FIG.3

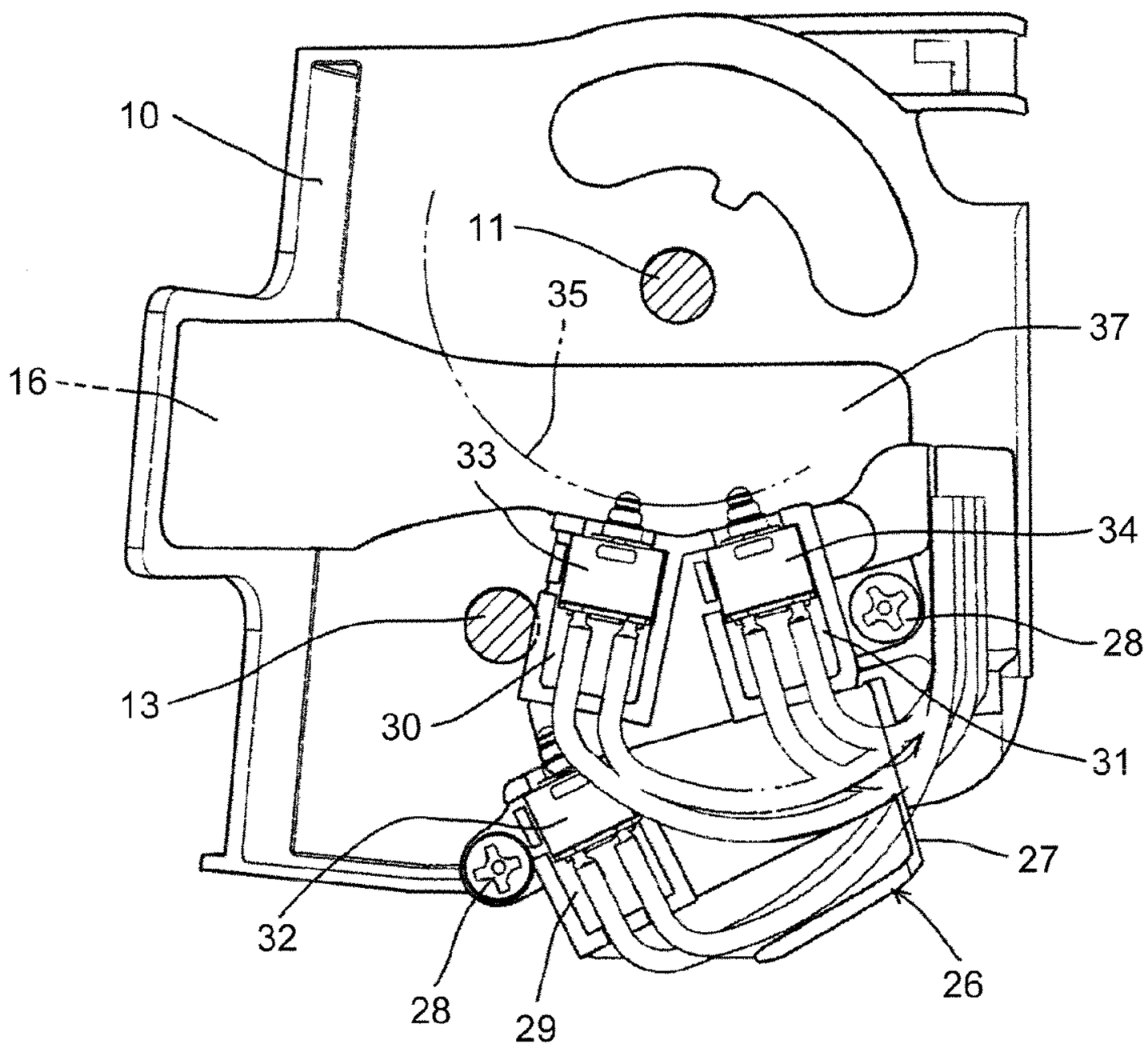


FIG.4

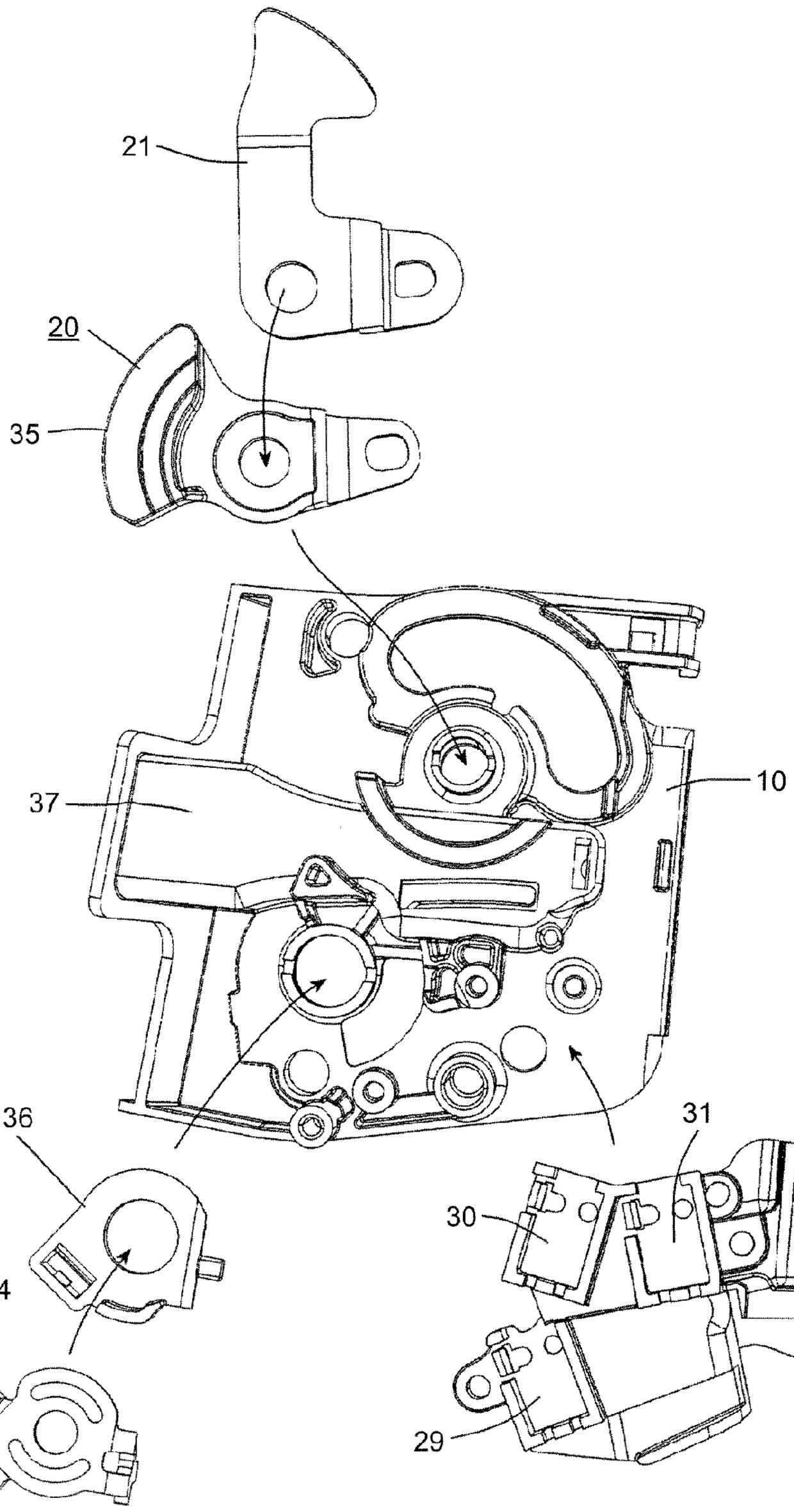


FIG.5

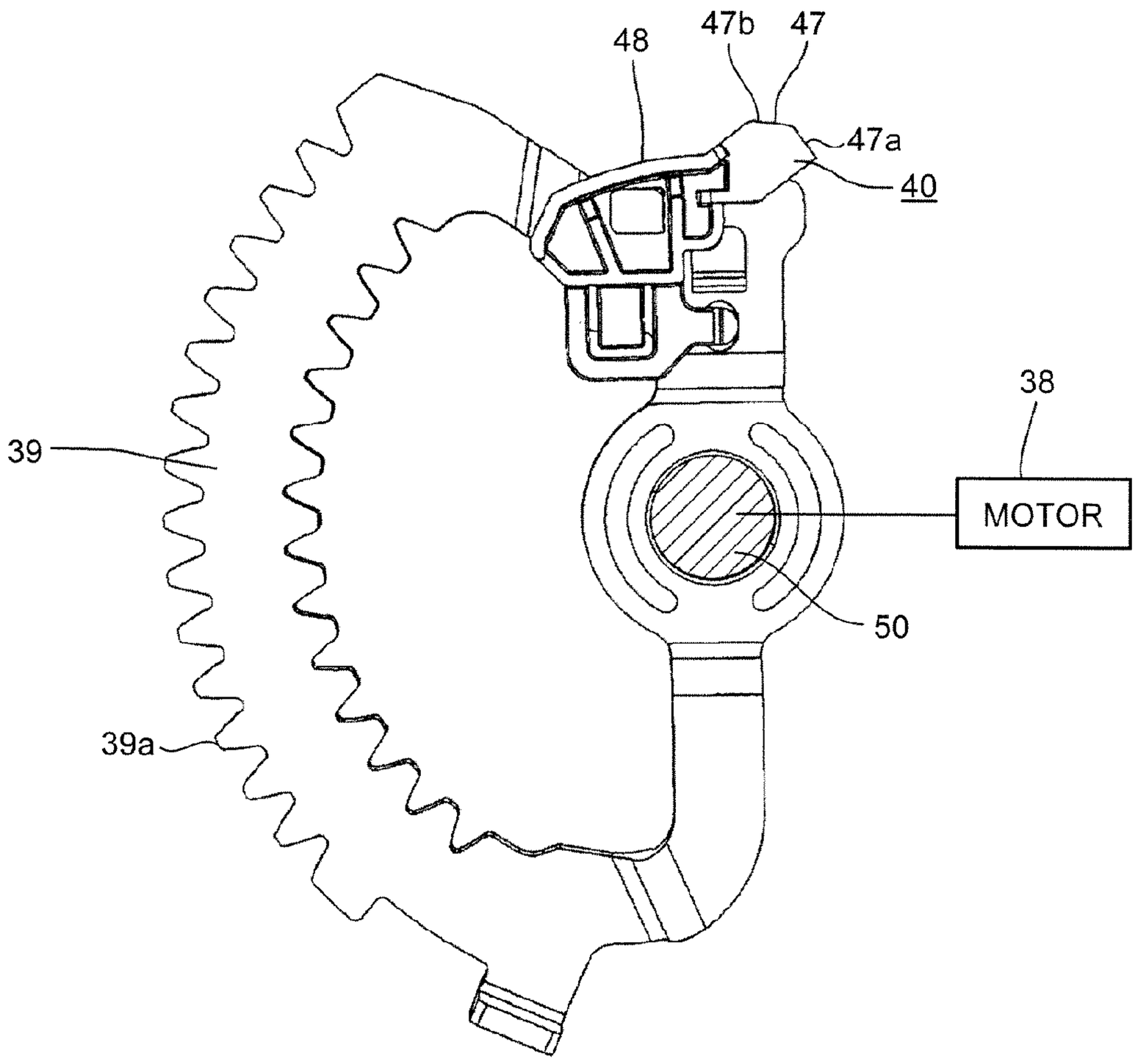


FIG.6

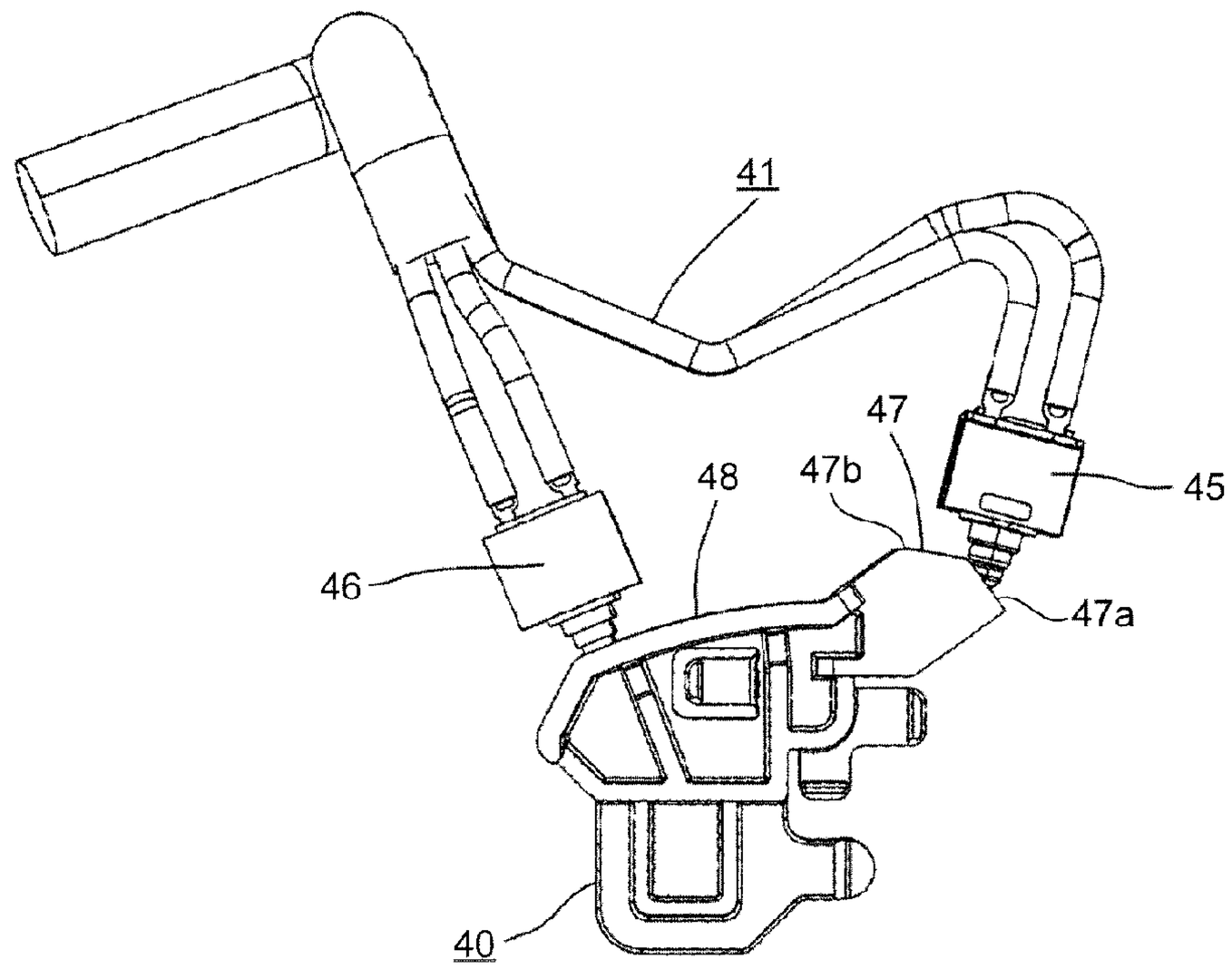


FIG.7

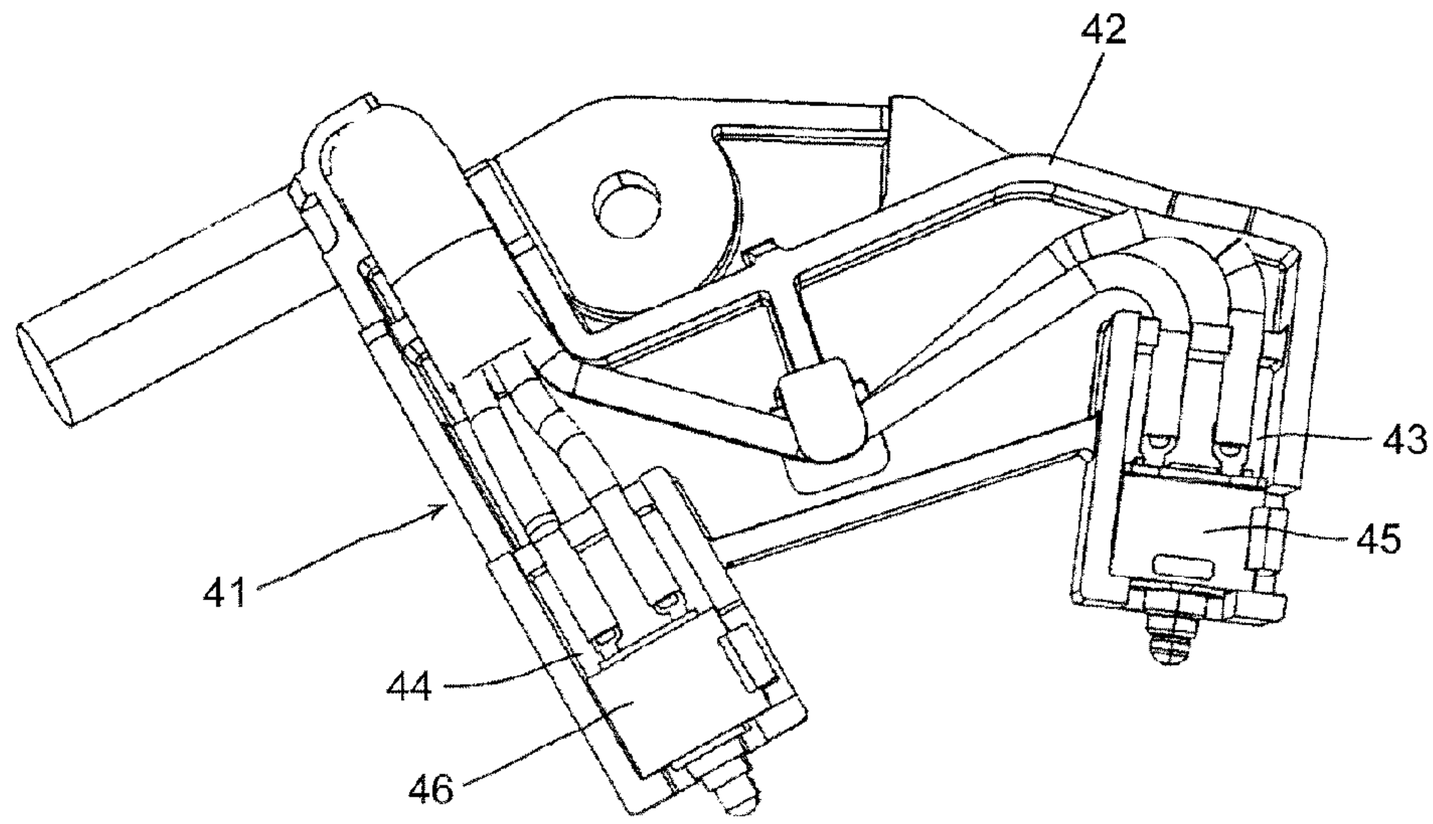


FIG.8

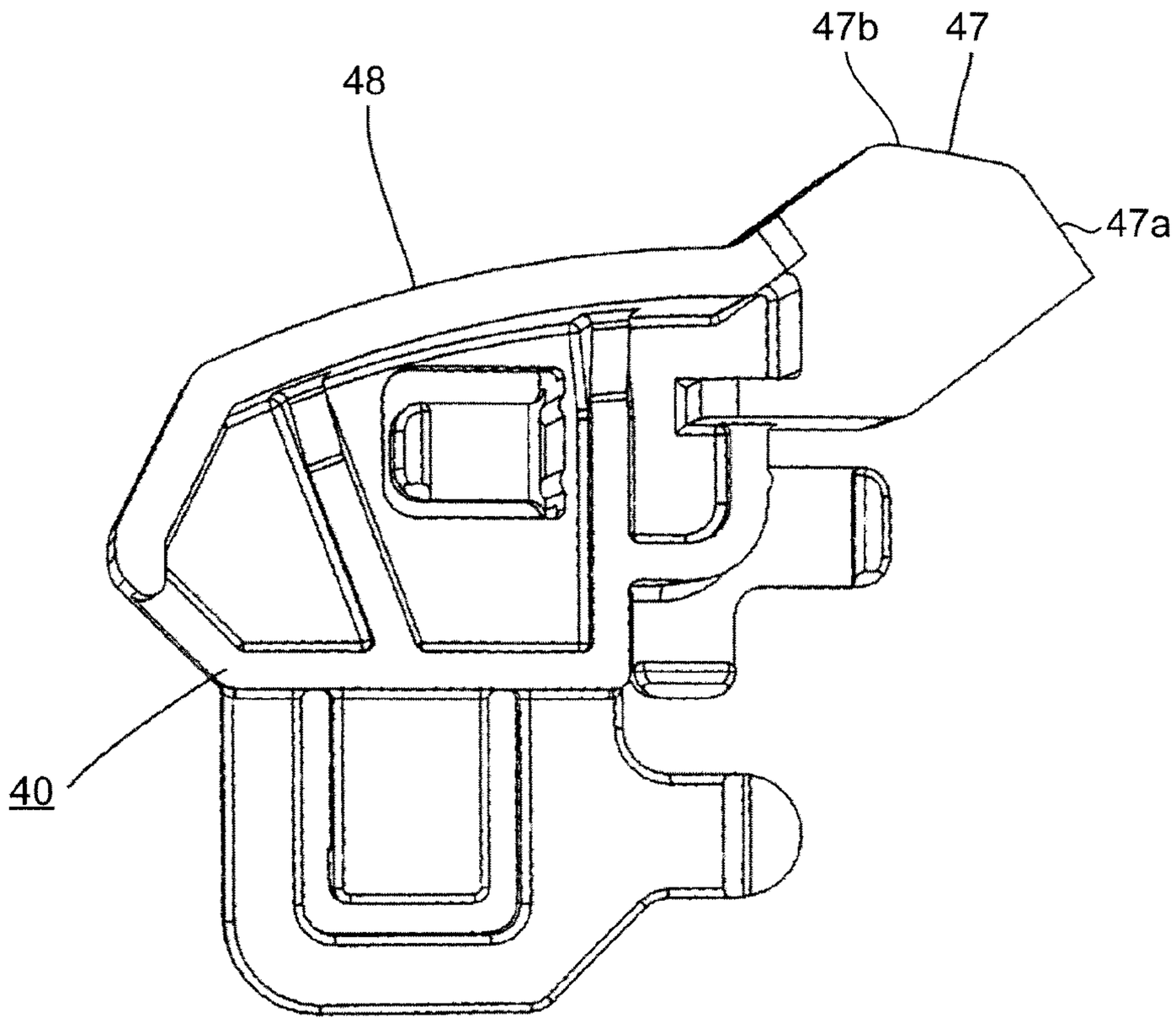
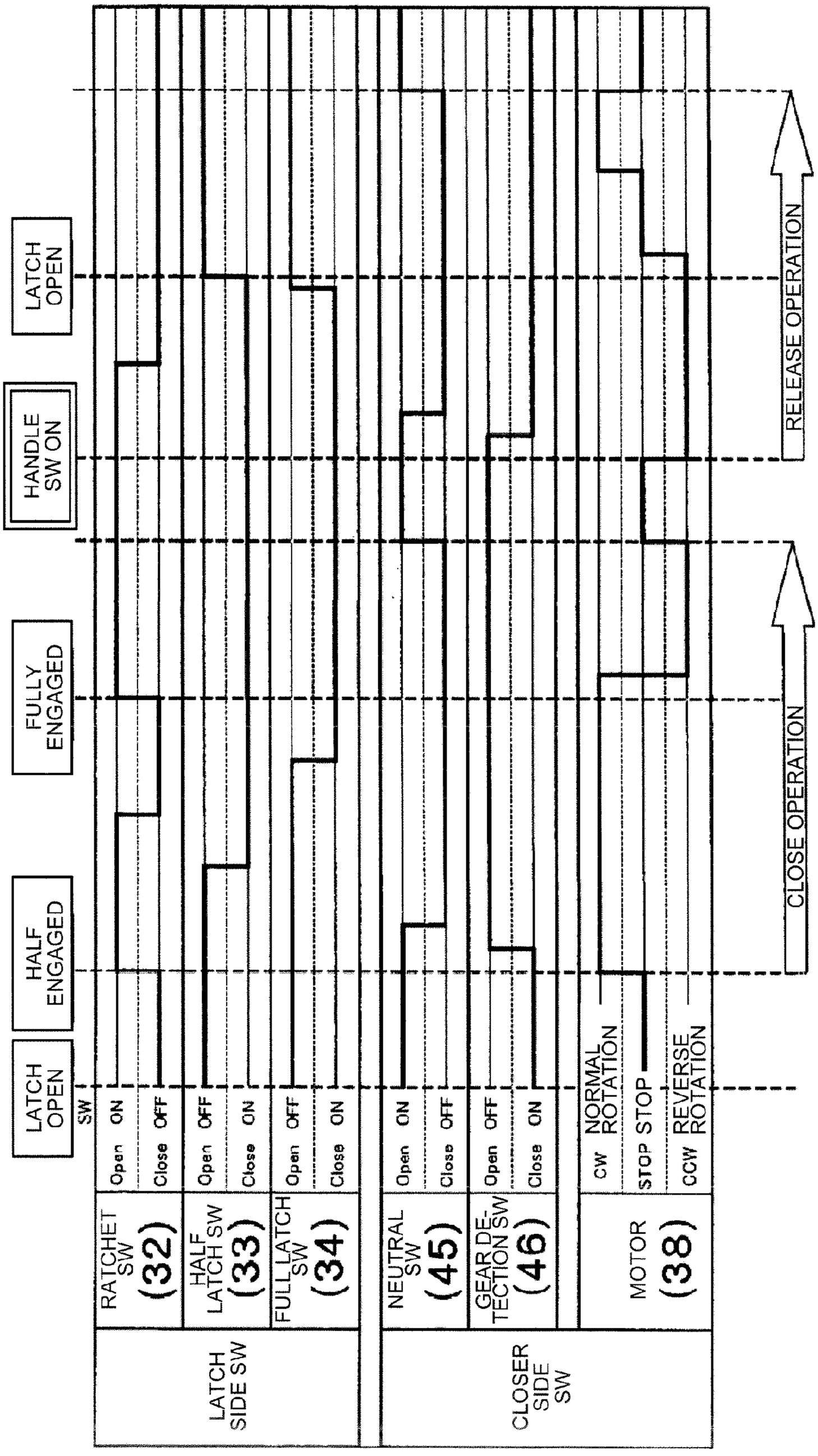


FIG.9


LATCH OPEN
HALF ENGAGED
FULLY ENGAGED
HANDLE SW ON
LATCH OPEN
RELEASE OPERATION
CLOSE OPERATION
SW
LATCH SIDE SW
RATCHET SW (32)
Open ON
Close OFF
HALF LATCH SW (33)
Open OFF
Close ON
FULL LATCH SW (34)
Open OFF
Close ON
CLOSER SIDE SW
NEUTRAL SW (45)
Open ON
Close OFF
GEAR DETECTION SW (46)
Open OFF
Close ON
MOTOR (38)
CW NORMAL ROTATION
STOP STOP
CCW REVERSE ROTATION

DRIVING DEVICE OF VEHICLE DOOR LATCH UNIT

CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims priority to and incorporates by reference the entire contents of Japanese Patent Application No. 2014-178598 filed in Japan on Sep. 2, 2014.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a vehicle door latch unit, and in particular, to a driving device of the latch unit.

2. Description of the Related Art

A conventionally well known latch unit includes a latch that engages with a striker and a ratchet that engages with the lath and holds the engagement between the latch and the striker, and in the latch unit, a driving device (a device having an automatic closing function, hereinafter also referred to as "automatic closing mechanism") that rotates the latch by a motor power from a half latch position to a full latch position is associatively connected to the latch, and a driving device (a device having an automatic releasing function, hereinafter also referred to as "automatic releasing mechanism") that rotates the ratchet by a motor power in a door opening direction (a direction in which the engagement with the latch is released) to bring a door into an openable state is associatively connected to the ratchet (for example, see Japanese Patent Application Laid-open No. 2014-009477, and see Japanese Patent Application Laid-open No. 2005-248485 for a latch unit including an automatic closing mechanism).

For control of the driving devices, signals from a plurality of switches are used. The plurality of switches are broadly classified into a driven side switch group that detects states (positions) of the latch and ratchet of the latch unit and a driving side switch group that detects a state (position) of a driving mechanism that rotates the latch and ratchet by a motor power.

A latch switch that detects an unlatch position, a half latch position, a full latch position, and the like of the latch and a ratchet switch that detects, for example, whether or not the ratchet has rotated to a position where the ratchet is able to engage with the latch correspond to the driven side switch group. A gear switch or the like that detects, for example, whether the driving mechanism, such as a sector gear, which is rotated by the motor power, is at a neutral position (initial position) or at an operation completion position corresponds to the driving side switch group.

Types and the numbers of the plurality of switches that are used vary, and methods of processing the signals from the plurality of switches also vary, depending on design concepts of the latch unit/driving mechanism, and in any case, durability of the switches and downsizing the cam body for turning the switches ON or OFF have been ongoing problems in the designing.

SUMMARY OF THE INVENTION

It is an object of the present invention to at least partially solve the problems in the conventional technology.

According to one aspect of the present invention, there is provided a driving device of a door latch unit, the driving device including: a neutral switch that switches over from ON to OFF, when an automatic closing function by a motor is operated and a first cam surface is released from a contact with the neutral switch; and a gear detection switch that switches over from ON to OFF, when an automatic closing function by the motor is operated and a second cam surface is released from a contact with the gear detection switch, wherein the operation of the automatic closing function by the motor is configured to be initiated by switch-over of a ratchet switch of the door latch unit from OFF to ON, the operation of the automatic closing function by the motor is configured to be ended by switch-over of the neutral switch from OFF to ON, and the gear detection switch is configured to switch over from OFF to ON by coming into contact with the second cam surface again when the automatic releasing function by the motor is operated.

The second cam surface according to another aspect of the present invention may be set at a height where the second cam surface does not come into contact with the neutral switch and the second cam surface may extends from an end portion of the first cam surface.

The above and other objects, features, advantages and technical and industrial significance of this invention will be better understood by reading the following detailed description of presently preferred embodiments of the invention, when considered in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front view of a latch unit of a door latch device to which a driving device, which is an embodiment of the present invention, is applied;

FIG. **2** is a rear view of the latch unit of FIG. **1** with a part thereof being omitted;

FIG. **3** is a rear view illustrating a state where a switch assembly of a driven side switch group has been installed in a latch body of the latch unit;

FIG. **4** is an exploded view of a rear face side of the latch unit;

FIG. **5** is a front view of a sector gear of the driving device attached with a gear interlocking cam body;

FIG. **6** is a front view illustrating the gear interlocking cam body and a switch assembly of a driving side switch group;

FIG. **7** is a front view illustrating the switch assembly of the driving side switch group;

FIG. **8** is an enlarged view of the gear interlocking cam body; and

FIG. **9** is a time chart.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of the present invention will be described. As illustrated in FIG. **1**, onto a latch body **10** of a latch unit (latch device), the latch body **10** being formed of a synthetic rein or the like, a latch **12** is pivotally supported by a latch shaft **11** and a ratchet **14** is pivotally supported by a ratchet shaft **13**. The latch **12** has an engagement groove **17**, a half latch engagement portion **18**, and a full latch engagement portion **19**. The engagement groove **17** is formed from an outer peripheral surface of the latch **12** towards the latch shaft **11** and has a width that is able to accommodate a striker **15**. The half latch engagement portion **18** is formed, as illustrated in FIG. **1**, at a portion positioned on a left side of an opening edge portion of the latch **12** in the engagement groove **17**. This half latch engagement portion **18** is configured to lock the latch **12** by

engaging with the ratchet **14** when the latch **12** is caused to be rotated in a clockwise direction and brought to a half latch position. The full latch engagement portion **19** is formed as a concave portion on the outer peripheral surface of the latch **12**. This full latch engagement portion **19** is configured to lock the latch **12** by engaging with the ratchet **14** when the latch **12** is rotated in the clockwise direction and brought to a full latch position.

The ratchet **14** has a claw part **14***a*. The claw part **14***a* is formed so as to protrude towards the latch **12**, at a radial direction end portion of the ratchet **14**. The ratchet **14** is engageable with the half latch engagement portion **18** and the full latch engagement portion **19** of the latch **12** via that protruded portion when the ratchet **14** is rotated in the clockwise direction. The ratchet **14** is continuously biased in the clockwise direction by a spring elastic force.

When a door moves to be closed, the striker **15** fixed to a vehicle body relatively advances into an advancement passage **16** formed in the latch body **10**, engages with the engagement groove **17** of the latch **12**, and causes the latch **12** at an unlatch position to be rotated in the full latch direction (clockwise direction). When the latch **12** is brought to the half latch position, the ratchet **14** is rotated in the clockwise direction by the spring elastic force and the claw part **14***a* and the half latch engagement portion **18** of the latch **12** become engageable with each other. Further, when the latch **12** is brought to the full latch position, the claw part **14***a* and the full latch engagement portion **19** of the latch **12** become engageable with each other. When the claw part **14***a* of the ratchet **14** engages with the full latch engagement portion **19** of the latch **12**, the door closing operation is complete and the door is maintained in a closed-door state.

FIG. **2** illustrates a rear face of the latch unit. At an end portion of the latch shaft **11**, a latch switch lever **20** and an automatic closing lever **21** as illustrated in FIG. **4** are installed. The latch switch lever **20** and the automatic closing lever **21** rotate integrally and in association with the latch **12**, and in this embodiment, the latch switch lever **20** and the automatic closing lever **21** are coupled to each other by a coupling pin **22** penetrating through the Latch body **10** and associatively rotate about the latch shaft **11**.

A conventionally well known motor-type automatic closing mechanism **23** is associatively coupled to the automatic closing lever **21**. When the automatic closing lever **21** is rotated by a motor power of the automatic closing mechanism **23**, the latch **12** at the half latch position is rotated by the motor power to the full latch position.

At an end portion of the ratchet shaft **13**, a ratchet lever **24** that rotates in association with the ratchet **14** is provided. The ratchet lever **24** preferably is made of a metal plate, and is able to operate in association with the ratchet **14** by a part of the ratchet lever **24** being bent and engaged with the ratchet **14**. The ratchet lever **24** is associatively coupled to an open handle (not illustrated) of a door. When the ratchet lever **24** is rotated by a door opening operation of the open handle, the ratchet **14** is rotated in a door opening direction (anticlockwise direction in FIG. **1**) and is released from the engagement with the latch **12**. When the ratchet **14** is released from the engagement with the latch **12**, the door is brought into an openable state.

Further, a conventionally well known motor-type automatic releasing mechanism **25** is associatively coupled to the ratchet lever **24**. The ratchet **14** is able to be released from the engagement with the latch **12** to bring the door into the openable state, also by a motor power of the automatic releasing mechanism **25**.

As illustrated in FIG. **3**, at a lower portion of the latch body **10** on a rear face side thereof (a ratchet side on a rear face of the latch body **10**), a switch assembly **26** of a driven side switch group is provided. The switch assembly **26** includes a switch case **27**, and a ratchet switch **32** and latch switches (a half latch switch **33** and a full latch switch **34**) that are installed in this switch case **27**. The switch case **27** is made of, for example, a synthetic resin. The switch case **27** is fixed to the latch body **10** by a fixing means **28**, such as a screw. Three switch accommodating portions **29**, **30**, and **31** are integrally formed with the switch case **27**. The ratchet switch **32** is accommodated in the switch accommodating portion **29**, the half latch switch **33** is accommodated in the switch accommodating portion **30**, and the full latch switch **34** is accommodated in the switch accommodating portion **31**. The switches **32**, **33**, and **34** are respectively accommodated in the switch accommodating portions **29**, **30**, and **31** beforehand to be separately manufactured as the assembly **26**. The switch case **27** is fixed to the latch body **10** by the fixing means **28** with the switches **32**, **33**, and **34** having been respectively installed in the switch accommodating portions **29**, **30**, and **31**.

The ratchet switch **32** detects a position of the ratchet **14**. The latch switches detect positions of the latch **12**, the half latch switch **33** detecting the half latch position of the latch **12** and the full latch switch **34** detecting the full latch position of the latch **12**.

The half latch switch **33** and full latch switch **34** switch over from OFF to ON by coming into contact with a cam surface **35** (see FIG. **2** and FIG. **4**) of the latch switch lever **20** that rotates in association with the latch **12**. The cam surface **35** is formed on an outer peripheral surface of the latch switch lever **20**. The positions of the latch **12** are detected by the cam surface **35** coming into contact with the latch switches **33** and **34** and the latch switches **33** and **34** switching over from OFF to ON, due to rotation of the latch switch lever **20**. Further, the ratchet switch **32** switches over from OFF to ON by coming into contact with a ratchet switch lever **36** of FIG. **4** (see FIG. **4**) that integrally rotates with the ratchet lever **24**. The ratchet switch lever **36** is provided, together with the ratchet lever **24**, at the end portion of the ratchet shaft **13**. A position of the ratchet **14** is detected by the ratchet switch lever **36** coming into contact with the ratchet switch **32** and the ratchet switch **32** being switched over from OFF to ON. The switch case **27** is arranged substantially below a rear face side bulged portion **37** of the latch body **10**, the rear face side bulged portion **37** zoning the advancement passage **16** in FIG. **3**.

A driving mechanism of this embodiment has the automatic closing mechanism **23** and the automatic releasing mechanism **25**. This driving mechanism is driven by one common motor **38**, and a sector gear **39** rotates normally (automatic closing rotation) from a neutral position by normal rotation of the motor **38** and the sector gear **39** rotates reversely (automatic releasing rotation) from the neutral position by reverse rotation of the motor **38**. These configurations themselves are able to be substituted with conventional configurations and thus description of details of the configurations will be omitted. The driving mechanism of this embodiment has, as illustrated in FIG. **5**, the motor **38** and the sector gear **39**. The sector gear **39** is pivotally supported by a sector shaft **50**. The sector gear **39** has a sector form and on a peripheral surface thereof, teeth **39***a* are formed. An output gear of the motor **38** is engaged with the teeth **39***a* of the sector gear **39**, and by the motor **38** being driven, the sector gear **39** is rotated about the sector shaft **50**. The sector gear **39** is configured to rotate the

automatic closing lever **21** such that the latch **12** is rotated in the full latch direction when the sector gear **39** rotates (normally rotates) in one direction (clockwise direction in FIG. **5**) from the neutral position and to rotate the ratchet lever **24** such that the ratchet **14** is rotated in a direction in which the ratchet **14** is released from the engagement with the latch **12** when the sector gear **39** rotates (reversely rotates) in the other direction (anticlockwise direction in FIG. **5**) from the neutral position. In the driving mechanism configured as described above, when the sector gear **39** normally rotates from the neutral position by a power of the motor **38**, the automatic closing lever **21** of FIG. **2** is rotated, the latch **12** is rotated in the full latch direction, the full latch engagement portion **19** of the latch **12** and the claw part **14***a* of the ratchet **14** engage with each other, and a closed-door state is achieved. Further, when the sector gear **39** reversely rotates from the neutral position, the ratchet lever **24** of FIG. **2** is rotated, the ratchet **14** separates from the latch **12**, and the openable state is achieved.

In this embodiment, two types of neutral position of the sector gear **39** are present, which are a neutral position in an open-door state and a neutral position in a closed-door state, in relation with a gear interlocking cam body **40** that turns a driving side switch group ON or OFF, the gear interlocking cam body **40** being the gist of the present application.

The gear interlocking cam body **40** as illustrated in FIG. **8** is attached to the sector gear **39** of this embodiment. The gear interlocking cam body **40** rotates about the sector shaft **50** integrally with the sector gear **39**. On a peripheral surface of the gear interlocking cam body **40**, a first cam surface **47** and a second cam surface **48** are formed along a circumferential direction of the gear interlocking cam body **40**. The first cam surface **47** is configured to have a right side surface **47***a* that is flat and a left side surface **47***b* that is adjacent to this right side surface **47***a* and that is flat. The first cam surface **47** is configured to be mountain-shaped when viewed from the front with the right side surface **47***a* and the left side surface **47***b*, and an apex thereof is formed to be obtuse-angled. The second cam surface **48** is linked to and starts from an end of the first cam surface **47**. Specifically, the second cam surface **48** extends from a left end of the left side surface **47***b* of the first cam surface **47** towards the left in FIG. **5**. The second cam surface **48** is configured to have a curved surface. This curved surface has an arc shape centering around the sector shaft **50** when viewed from the front.

In the vicinity of the gear interlocking cam body **40**, as illustrated in FIG. **6**, a switch assembly **41** that is the driving side switch group is provided. The switch assembly **41** includes a switch case **42** (not illustrated in FIG. **6** but see FIG. **7**) and a neutral switch **45** and a gear detection switch **46**, which are installed in this switch case **42**. The switch case **42** is made of, for example, a synthetic resin. The switch case **42** (FIG. **7**) is fixed to a base plate or the like (not illustrated) of the driving mechanism by a fixing means, such as a screw. Two switch accommodating portions **43** and **44** are integrally formed with the switch case **42**. The neutral switch **45** is accommodated in the switch accommodating portion **43** and the gear detection switch **46** is accommodated in the switch accommodating portion **44**, to be separately manufactured as the switch assembly **41**.

The neutral switch **45** is configured to be turned ON by coming into contact with the mountain-shaped first cam surface **47** of the gear interlocking cam body **40**. The neutral switch **45** is kept in the ON state by being in contact with the right side surface **47***a* of the first cam surface **47** as illustrated in FIG. **6** in an initial state of the open-door state (see, simultaneously, FIG. **9**). This state is the neutral position of the sector gear **39** in the open-door state. When the door closing operation is started from the state of FIG. **6** by the activation of the automatic closing mechanism **23**, the sector gear **39** is rotated in the clockwise direction in FIG. **5**, the neutral switch **45** is kept in the ON state until the neutral switch **45** goes over the apex of the first cam surface **47** and is released from a contact with the left side surface **47***b* of the first cam surface **47**, and the neutral switch **45** is switched OFF when the neutral switch **45** is released from a contact with the left side surface **47***b*. The switch assembly **41** of this embodiment is configured such that the second cam surface **48** does not come into contact with the neutral switch **45**.

The gear detection switch **46** is configured to be turned ON by coming into contact with the second cam surface **48**, which is a continuous single arc surface of the gear interlocking cam body **40**. The gear detection switch **46** is in contact with a left end portion of the second cam surface **48** as illustrated in FIG. **6** and is kept in the ON state in the initial state of the open-door state (see FIG. **9**). When the door closing operation is started from the state of FIG. **6** by the activation of the automatic closing mechanism **23**, the sector gear **39** is rotated in the clockwise direction in FIG. **5** and the gear detection switch **46** is immediately switched OFF by being released from the contact with the second cam surface **48**. That is, in this embodiment, after the start of the door closing operation by the activation of the automatic closing mechanism **23**, a duration of the ON state of the gear detection switch **46** is caused to be shorter than a sustaining time period of the ON state of the neutral switch **45**. The neutral switch **45** and the gear detection switch **46** are both switched over from ON to OFF after the start of the door closing operation by the activation of the automatic closing mechanism **23**, but at this stage, control based on this signal switch-over is not performed. However, the immediate switch-over of the gear detection switch **46** from ON to OFF because of the gear detection switch **46** having been positioned at the left end portion of the second cam surface **48** is an important matter related to the gist of the present application, as described later.

The closing operation by the activation of the automatic closing mechanism **23** will now be described. By a door moving in a door closing direction, the striker **15** comes into contact with the latch **12** to rotate the latch **12** in the full latch direction. When the half latch engagement portion **18** of the latch **12** passes the claw part **14***a* of the ratchet **14**, the ratchet **14** is rotated in the clockwise direction in FIG. **1** by the spring elastic force. By the rotation of the ratchet **14** in the clockwise direction, the ratchet switch **32** comes into contact with the ratchet switch lever **36** to be turned ON, and a half latch state is detected system-wise. When the ratchet switch **32** is turned ON, the automatic closing mechanism **23** is activated and the door closing operation is started. When the door closing operation is started by the activation of the automatic closing mechanism **23**, the sector gear **39** is rotated in the clockwise direction in FIG. **5** by a power of the motor **38**. When the sector gear **39** is rotated in the clockwise direction, first, the second cam surface **48** is released from the contact with the gear detection switch **46** and the gear detection switch **46** is turned OFF, and subsequently, the first cam surface **47** is released from the contact with the neutral switch **45** and the neutral switch **45** is turned OFF (the gear detection switch **46** does not contact with the second cam surface **48** that is depressed).

After the half latch state is detected, by the operation of the automatic closing mechanism **23** being continued, the

latch **12** is rotated in the full latch direction, the cam surface **35** of the latch switch lever **20** comes into contact with the half latch switch **33** to turn the half latch switch **33** ON, and subsequently, the full latch switch **34** is turned ON by coming into contact with the cam surface **35**. After the half latch switch **33** is turned ON and before the full latch switch **34** is switched ON, the ratchet **14** is pushed back in the door opening direction (anticlockwise direction in FIG. **1**) against the spring elastic force by the contact with a side surface (peripheral surface) of the latch **12**. By this rotation of the ratchet **14** in the anticlockwise direction, the ratchet switch **32** is released from the contact with the ratchet switch lever **36** and turned OFF. When the full latch engagement portion **19** of the latch **12** passes the claw part **14***a* of the ratchet **14**, the ratchet **14** is rotated in the clockwise direction in FIG. **1** by the spring elastic force again. By this rotation of the ratchet **14** in the clockwise direction, the ratchet switch **32** comes into contact with the ratchet switch lever **36** to be turned ON, and a full latch state is detected system-wise.

When the full latch state is detected, after some time lag for safety, the motor **38** is rotated reversely and the automatic closing mechanism **23** (sector gear **39**) returns to neutral. This return to neutral is detected by the sector gear **39** being rotated in the anticlockwise direction in FIG. **5** by the reverse rotation of the motor **38** and the neutral switch **45** coming into contact with the left side surface **47***b* of the first cam surface **47** to be switched ON from OFF. The operation of the automatic closing mechanism **23** is ended by this return of the sector gear **39** to neutral. The state of FIG. **6** illustrates the neutral position of the sector gear **39** in the open-door state and the neutral switch **45** therein is ON by being in contact with the right side surface **47***a* of the first cam surface **47**. After the door has been closed, the neutral switch **45** is turned ON by coming into contact with the left side surface **47***b* of the first cam surface **47**. Such a state where the neutral switch **45** has been turned ON by the contact with the left side surface **47***b* of the first cam surface **47** is the neutral position in the closed-door state. In this state, the gear detection switch **46** is not in contact with the second cam surface **48**. Accordingly, as illustrated in FIG. **9**, the OFF-state of the gear detection switch **46** is continued even after the operation of the automatic closing mechanism **23** is ended.

The gear detection switch **46** is turned ON after the sector gear **39** is reversely rotated by the automatic releasing mechanism **25** (after the automatic releasing function is operated). After the automatic releasing function is operated and until the automatic closing function is operated, the ON state of the gear detection switch **46** is continued. Thus, in the closed-door state that is used overwhelmingly longer than the open-door state, the gear detection switch **46** is maintained in the OFF state.

Since, according to the above description of this embodiment, the operation of the automatic closing mechanism **23** is configured to be initiated from the switch-over of the ratchet switch **32** from OFF to ON, a timing to start the operation of the automatic closing mechanism **23** is clarified.

Further, when the automatic closing mechanism **23** is operated to close the door, the neutral switch **45** separates from the mountain-shaped first cam surface **47** of the gear interlocking cam body **40** to be switched over from ON to OFF, the gear detection switch **46** positioned at the left end portion of the second cam surface **48** is immediately released from the contact with the second cam surface **48** after the activation of the automatic closing mechanism **23** to be switched over from ON to OFF, and thus, particularly, a duration of the ON state of the gear detection switch **46** is able to be set short and improvement of the durability is able to be expected.

Further, since the gear detection switch **46** is configured to be turned ON by coming into contact with the second cam surface **48** for detecting the automatic releasing operation and is set to be turned ON only when the door is opened, an ON time period of the gear detection switch **46** is able to be set short and improvement of the durability is able to be expected, even further.

Further, since the second cam surface **48** that detects the automatic releasing operation with a rotation amount less than the rotation amount of the automatic closing operation is linked to the end of the left side surface **47***b* of the first cam surface **47**, the gear interlocking cam body **40** is able to be downsized.

According to the present invention, since operation of an automatic closing mechanism is configured to be initiated by switch-over of a ratchet switch from OFF to ON, a timing to start the operation of the automatic closing mechanism is clarified, and as a result, in a short time period after operating the automatic closing mechanism, a gear detection switch is able to be separated from a second cam surface to be switched over from ON to OFF, an ON time period of the gear detection switch is able to be set short, and improvement of the durability is able to be expected.

Further, since the second cam surface that does not come into contact with a neutral switch is linked to an end of a first cam surface, a gear interlocking cam body is able to be downsized.

Although the invention has been described with respect to specific embodiments for a complete and clear disclosure, the appended claims are not to be thus limited but are to be construed as embodying all modifications and alternative constructions that may occur to one skilled in the art that fairly fall within the basic teaching herein set forth.

What is claimed is:

1. A driving device of a door latch unit, the driving device comprising:

a neutral switch that switches over from ON to OFF, when an automatic closing function by a motor is operated and a first earn surface, is released from a contact with the neutral switch; and

a gear detection switch that switches over from, ON to OFF, when aft automatic closing function by the motor is operated and a second cam-surface is released from a contact with the gear detection switch, wherein

the operation of the automatic closing function by the motor is configured to be initiated by switch-over of a ratchet switch of the door latch unit from OFF to ON,

the operation of the automatic closing function by the motor is configured to be ended by switch-over of the neutral switch from, OFF to ON,

the gear detection switch is configured to switch over from OFF to ON by coming into contact with the second cam surface again when the automatic releasing function by the motor Is operated, and

the first cam surface and the second cam surface form a continuous surface in a circumferential direction,

wherein the second cam surface is set at a height where the second cam surface does not come Into contact with the neutral switch and the second earn surface extends from an end portion of the first cam surface.

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